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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/587,592	07/28/2006	Tomomi Meguro	81844.0051	2418

26021 7590 12/08/2009
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EXAMINER

TALBOT, BRIAN K

ART UNIT	PAPER NUMBER
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1792

NOTIFICATION DATE	DELIVERY MODE
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12/08/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/587,592	Applicant(s) MEGURO ET AL.	
	Examiner Brian K. Talbot	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 September 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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1. The amendment filed 9/16/09 has been considered and entered. Claims 1-7 remain in the application.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. In light of the amendment filed 9/16/09, the 35 USC 102 rejection has been withdrawn. However, the following 35 USC 103 rejection has been necessitated by the amendment.

Claim Rejections - 35 USC § 103

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

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invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al. (5,545,443) in combination with Lau et al., "Growth of Epitaxial ZnO thin films by organometallic Chemical Vapor Deposition".

Yamada et al. (5,545,443) teaches a method of transparent conductive zinc oxide film by incorporating a boron or aluminum containing material. Purified water is also introduced to form the oxide (abstract). The boron compound is diborane and can be diluted with hydrogen (col. 4, lines 39-50). The zinc compound is dimethyl zinc (col. 4, lines 18-22). Argon is the carrier gas.

Yamada et al. (5,545,443) fails to teach diluting the oxidizing agent with hydrogen.

Lau et al., "Growth of Epitaxial ZnO thin films by organometallic Chemical Vapor Deposition" teaches forming ZnO films by reacting diethylzinc and $\text{H}_2\text{O}/\text{H}_2$, $\text{N}_2\text{O}/\text{H}_2$ and CO_2/H_2 oxidizing systems (abstract).

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified Yamada et al. (5,545,443) process to include the oxidizing agent to be mixed with hydrogen as evidenced by Lau et al., "Growth of Epitaxial ZnO thin films by organometallic Chemical Vapor Deposition" with the expectation of achieving similar success and improved uniformity and surface finish.

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7. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 03/021690 – translation provided by Kroll et al. (7,390,731) or Vijayakumar et al. (4,851,149) in combination with Lau et al., “Growth of Epitaxial ZnO thin films by organometallic Chemical Vapor Deposition”.

WO 03/021690 – translation provided by Kroll et al. (7,390,731) teaches a method of depositing an oxide layer on a substrate and a photovoltaic cell using said substrate. The photovoltaic cell includes a transparent substrate, a transparent conductive oxide, amorphous silicon, crystalline silicon and a rear contact electrode film (col. 2, lines 30-45 and Fig. 1). The conductive oxide film and/or electrode film can be zinc oxide doped with aluminum or boron. The zinc oxide can be provided by an organozinc such as diethyl zinc. An oxidizer is added such as water and the boron is added with diborane (col. 2, line 60 – col. 3, line 25).

WO 03/021690 – translation provided by Kroll et al. (7,390,731) fails to teach the use of a diluting gas such as hydrogen.

Vijayakumar et al. (4,851,149) teaches a chemical vapor deposition of zinc oxide films and products. A zinc oxide is formed by using an organozinc, water and a inert gas. The zinc oxide can be doped with a Group III element (abstract). The organozinc is a dimethyl zinc (col. 2, lines 33-37). The inert gas includes argon or helium or other inert gases such as nitrogen (col. 3, lines 48-52). The Group III element can be aluminum or boron by introducing trimethyl aluminum or diborane (col. 3, lines 62-66).

Vijayakumar et al. (4,851,149) fails to teach hydrogen as the inert gas.

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Lau et al., “Growth of Epitaxial ZnO thin films by organometallic Chemical Vapor Deposition” teaches using hydrogen gas as a diluting gas with the oxidizing agent in the formation of zinc oxide film doped with boron and aluminum (see above).

Therefore it would have been obvious at the time the invention was made to have modified either WO 03/021690 – translation provided by Kroll et al. (7,390,731) or Vijayakumar et al. (4,851,149) with an inert diluting gas of hydrogen as evidenced by Lau et al., “Growth of Epitaxial ZnO thin films by organometallic Chemical Vapor Deposition” with the expectation of achieving similar success and improved uniformity and surface finish.

8. Claims 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al. (5,545,443) in combination with Lau et al., “Growth of Epitaxial ZnO thin films by organometallic Chemical Vapor Deposition” further in combination with Nishida (5,002,796) or vice versa.

Features detailed above concerning the teachings of Yamada et al. (5,545,443) in combination with Lau et al., “Growth of Epitaxial ZnO thin films by organometallic Chemical Vapor Deposition” are incorporated here.

Yamada et al. (5,545,443) in combination with Lau et al., “Growth of Epitaxial ZnO thin films by organometallic Chemical Vapor Deposition” fails to teach the photoelectric structure claimed with the transparent substrate electrode, amorphous silicon, crystalline silicon and another electrode.

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Nishida (5,002,796) teaches this structure regarding a zinc oxide film using an oxygen compound and a alkyl zinc for forming photovoltaic devices (abstract). The structure is depicted in Fig. 3 and detailed in Example 4.

Therefore it would have been obvious at the time the invention was made to have modified Yamada et al. (5,545,443) in combination with Lau et al., "Growth of Epitaxial ZnO thin films by organometallic Chemical Vapor Deposition" process to form the structure as depicted in Nishida (5,002,796) or to have formed the zinc oxide electrode of Nishida (5,002,796) by the method of Yamada et al. (5,545,443) with the expectation of achieving similar success.

Response to Amendment

9. Applicant's arguments with respect to claims 1-7 have been considered but are moot in view of the new ground(s) of rejection.

Applicant argued that the prior art fails to teach diluting or mixing the oxidizing agent with hydrogen in the formation of ZnO films.

Lau et al., "Growth of Epitaxial ZnO thin films by organometallic Chemical Vapor Deposition" teaches this limitation as detailed above.

The Declaration 37 CFR 1.132 is noted but does not overcome the rejection as detailed above.

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10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian K. Talbot whose telephone number is (571) 272-1428. The examiner can normally be reached on Monday-Friday 8AM-4PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy H. Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Brian K Talbot/
Primary Examiner, Art Unit 1792

bkt